REMARKS

Claims 1-44 were presented for examination. In an Office action dated September 5, 2007, claims 1-44 were rejected. Claims 2, 16, 18, and 32 have been cancelled herein. Claims 1, 3-5, 15, 17, 31, and 33-35 are amended herein to more distinctly claim Applicant's invention. In making these amendments, Applicant does not concede that the subject matter of the prior claims was in fact disclosed or taught by the cited prior art. Rather, Applicant reserves the right to pursue such protection at a later point in time in this or another application.

Applicant thanks the Examiner for examination of the claims pending in this application and addresses the Examiner's comments below. Based on the above Amendment and following Remarks, Applicant respectfully requests that the Examiner reconsider all outstanding rejections and withdraw them.

Objection to the Specification

The Examiner objected to the specification because the Abstract exceeded 150 words. Appropriate correction has been made herein to reduce the length of the Abstract to comply with the 150 word limit.

Response to Rejections Under 35 USC 103(a)

The Examiner rejected claims 1, 3-5, 8-9, 11-13, 15, 17, 19-21, 24-25, 27-29, 31, 33-35, 38-39, and 41-43 under 35 USC § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,539,351 to Chen et al. ("Chen") in view of Pellom et al., 'An efficient scoring algorithm for Gaussian mixture model based speaker identification', IEEE signal processing letters, Vol. 5, 1998, pages 28, 1-284 ("Pellom"). Claims 2, 6, 16, 18, 22, 32, and 36 were rejected under 35 USC § 103(a) as allegedly being unpatentable over Chen in view of Pellom

in further view of Bahler U.S. Patent No. 5,271,088 ("Bahler"). The limitations of claims 2, 16, 18, and 32 have been incorporated into claims 1, 15, 17, and 31 respectively. Claims 2, 16, 18, and 32 have been cancelled. These rejections are traversed.

As amended, claim 1 recites a method of voice recognition comprising "estimating a probability density function of a subset of the plurality of speaker data points using Parzen windows, wherein the subset comprises the approximate nearest neighbors to an unidentified voice sample from an unidentified speaker, the subset not including all speaker data points in the plurality of speaker data points." This feature of the claimed invention is beneficial because the Parzen windows approach requires no training, but it is computationally intensive in terms of time and computing power. To improve the performance of the method and save computational resources, the probability density function is estimated for a subset of the plurality of speaker data points, the subset not including all speaker data points. This allows the method to be applied even for large datasets. See Applicant's Specification paragraphs [0004] – [0008] for a discussion of the inadequacies with regard to accuracy and computational efficiency of prior methods, particularly for large and feature rich data sets.

Chen discloses generating high dimensional acoustic models via mixtures of compound Gaussians with linear transforms for speech and speaker recognition. See, Abstract. As the Examiner acknowledges, Chen does not disclose use of the approximate nearest neighbors to an unidentified voice sample. Chen also does not disclose estimating a probability density function of a subset of the plurality of speaker data points using Parzen windows… the subset not including all speaker data points, nor does the Examiner suggest that Chen does so disclose or suggest.

Pellom discloses approximated nearest neighbor Gaussian mixture density evaluation. (P. 283, left col., last paragraph). However, Pellom does not disclose or suggest estimating a probability density function of a subset of the plurality of speaker data points using Parzen windows… the subset not including all speaker data points, nor does the Examiner suggest that Pellom does so disclose or suggest. Therefore, the rejection of claim 1 based on Chen and Pellom is improper and should be withdrawn.

In rejecting original claim 2, the Examiner turns to Bahler for a description of using Parzen windows to estimate local probability density. Bahler discloses message match scoring using Parzen estimates of local probability density. In the Parzen estimate, the distance from the observation point of the unknown to its nearest neighbor is used. Col. 8, ln. 31-42. The Examiner suggests in the Office Action dated September 5, 2007, that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Chen in view of Pellom with the teachings of Bahler. However, Bahler teaches away from using a subset of the plurality of speaker data points, the subset not including all speaker data points. Bahler teaches that more data is better for Parzen estimates, stating, "[I]n a parameter space of more than about five dimensions, an absolutely enormous reference set is necessary in order for the Parzen estimate to be a reasonable one." Col. 8, ln. 55-59. Bahler does not suggest using a subset not including all speaker data points. Rather, Bahler teaches "each frame of the unknown is compared to every frame of the reference message" (col. 9, ln. 63-64) and "comparing each frame of the reference to all frames of the unknown…" (col. 10, ln. 1-3) to form the score values used in Bahler's message matching. Therefore, one of ordinary skill in the art would be lead away from combining the teachings of Bahler to use all data to improve the Parzen estimate with the

teachings of Pellom to use approximate nearest neighbor techniques to find a subset not including all speaker data points. Hence, it would be improper to reject claim 1 under 35 USC § 103(a) based on the combination of Chen, Pellom and Bahler for at least these reasons.

Claim 15 similarly recites "retrieving a subset of speaker data points …, the subset not including all speaker data points in the plurality of speaker data points;" and "estimating a probability density function from a subset of the plurality of speaker data points using Parzen windows." Claim 17 similarly recites "means for estimating a density of a subset of the plurality of speaker data points using Parzen windows…, the subset not including all speaker data points in the plurality of speaker data points." Claim 31 similarly recites "estimating a probability density function of a subset of the plurality of speaker data points using Parzen windows…, the subset not including all speaker data points in the plurality of speaker data points." All arguments advanced above with respect to claim 1 apply equally to claims 15, 17, and 31. As claims 3-6, 8-9, 11-13, 19-22, 24-25, 27-29, 33-36, 38-39, and 41-43 depend either directly or indirectly from the patentable independent claims 1, 15, 17, or 31 discussed above, all arguments advanced above with respect to claims 1, 15, 17, and 31 are hereby incorporated so as to apply to these dependent claims as well. In addition, claims 3-6, 8-9, 11-13, 19-22, 24-25, 27-29, 33-36, 38-39, and 41-43 recite other patentable features which further distinguish them from the prior art of record. Applicant submits that dependent claims 3-6, 8-9, 11-13, 19-22, 24-25, 27-29, 33-36, 38-39, and 41-43 are patentable over the prior art of record by reason of their dependency, in addition to the further patentable limitations recited therein.

The Examiner rejected claims 7, 10, 23, 26, 37 and 40 under 35 USC § 103(a) as allegedly being unpatentable over Chen, in view of Pellom, and in further view of Arya et al., "An optional algorithm for approximated nearest neighbor searching in fixed dimensions", Journal of the ACM, Vol. 45, No. 6, November 1998, pp. 89 1-923) hereinafter "Arya". This rejection is traversed.

Arya does not remedy the deficiencies of the Examiner's proposed combination of Chen and Pellom, even with the addition of Bahler, as discussed above with respect to claim 1. Arya discloses a kd-tree data structure. Page 914, paragraph 2. Arya does not disclose or suggest the feature of "estimating a probability density function of a subset of the plurality of speaker data points using Parzen windows, wherein the subset comprises the approximate nearest neighbors to an unidentified voice sample from an unidentified speaker, the subset not including all speaker data points in the plurality of speaker data points" as recited in claim 1 nor the other similar features disclosed in claims 17 and 31, nor does the Examiner suggest that Arya does disclose the feature.

Applicant respectfully submits that for at least these reasons claims 7, 10, 23, 26, 37, and 40 which depend either directly or indirectly on independent claim 1, 17, or 31 are patentably distinguishable over the cited references, alone and in combination. Therefore, Applicant respectfully requests that the Examiner reconsider the rejection and withdraw it.

The Examiner rejected claims 14, 30, and 44 under 35 USC § 103(a) as allegedly being unpatentable over Chen, in view of Pellom, in further view of U.S. Patent No. 5,414,755 to Bahler et al. ("Bahler '755"). This rejection is traversed.

Bahler '755 does not remedy the deficiencies of the Examiner's proposed combination of Chen and Pellom, even with the addition of Bahler, as discussed above with

respect to claim 1. Bahler '755 discloses a "text-independent approach" to speaker recognition. Col. 4, ln. 28-36. Bahler does not disclose or suggest the feature of estimating a probability density function of a subset of the plurality of speaker data points using Parzen windows, wherein the subset comprises the approximate nearest neighbors to an unidentified voice sample from an unidentified speaker, the subset not including all speaker data points in the plurality of speaker data points" as recited in claim 1 nor the other similar features disclosed in claims 17 and 31, nor does the Examiner suggest that Bahler '755 does disclose the feature.

Applicant respectfully submits that for at least these reasons claims 14, 30, and 44 which depend either directly or indirectly on independent claim 1, 17, or 31 are patentably distinguishable over the cited references, alone and in combination. Therefore, Applicant respectfully requests that the Examiner reconsider the rejection and withdraw it.

Conclusion

In sum, Applicant respectfully submits that all claims now pending are patentable over the cited references for at least the reasons given above, while not necessarily conceding any contention not specifically addressed. Applicant requests reconsideration of the basis for the rejections of these claims and requests allowance of them.

If the Examiner believes that for any reason direct contact with Applicant's attorney would help advance the prosecution of this case, the Examiner is invited to telephone the undersigned at the number given below.

Respectfully Submitted,
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Date: December 5, 2007 By: /Robin W. Reasoner/

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